From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/PT2004/000025	28.10.2004	29.10.2003

International Patent Classification (IPC) or both national classification and IPC
D06M16/00

Applicant
UNIVERSIDADE DO MINHO

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:

   ☐ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ not paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☒ all parts.

   ☐ the parts relating to claims Nos.

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-5,7-11
	No:	Claims	6,
Inventive step (IS)	Yes:	Claims	1-5,9
	No:	Claims	6-8,10,11
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations

   see separate sheet

Reference is made to the following documents:

D1: US-A-5 599 698
D2: US-A-6 066 494

Re Item IV
Lack of unity of invention

The common concept linking together the independent claims 1 and 5 is the treatment of a fibre with an enzyme solution in order to modify the chemical surface of the fibre and increasing the hydrophilic characteristics.

This common concept is not novel, see document D1 (abstract).

Hence the following separate inventions or groups of inventions are not so linked as to form a single general inventive concept:

Claims 1 to 5, 11:
Method for the treatment of polyacrylonitrile fibre containing vinyl acetate as a comonomer wherein the fibre is contacted with an enzyme solution in order to modify the chemical surface of the fibre, increasing the number of hydrophilic hydroxyl groups.
Claims 6 to 11:
Method for the treatment of polyamide wherein the fibre is contacted with an enzyme solution, increasing the number of hydrophilic amino groups.

In conclusion, the groups of claims are not linked by common or corresponding special technical features and define 2 different inventions not linked by a single general inventive concept.
The application, hence does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The first embodiment of the current application consists of a method for the treatment of polyacrylonitrile fibre containing vinyl acetate as a comonomer wherein the fibre is contacted with an enzyme solution in order to modify the chemical surface of the fibre, increasing the number of hydrophilic hydroxyl groups.

The subject matter of independent claim 1 is new in view of the documents cited in the Search Report or mentioned in the current application, since none of these documents discloses the treatment of said fibres with an enzyme solution, increasing the number of hydrophilic hydroxyl groups.

The problem underlying the first embodiment of the application is to provide polyacrylonitrile fibres having greater hydrophilic characteristics and improved properties.

Document D1 discloses a method in which said fibres are treated with a nitryl hydratase enzyme obtained from *Brevibacterium imperiale.*
Contrary to the current application this modification of the chemical surface of the fibre does not increase the number of hydrophilic hydroxyl groups.
D1 neither teaches nor suggests the use of an enzyme solution which increases the number of hydrophilc hydroxyl groups of polyacrylonitril fibres containing vinyl acetate as comonomer.

Thus, the subject matter of claim 1 seems to fulfil the requirements of Articles 33(2) and (3) PCT.
Claims 2 to 5 and 11 (partly) are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

2. The second embodiment of the current application consists of a method for the treatment of polyamide wherein the fibre is contacted with an enzyme solution, increasing the number of hydrophilic amino groups.

Document D2 discloses an enzyme treatment to enhance wettability and absorbency of

textiles. D2 discloses, inter alia, the use of lipases (enzymes of the hydrolase main group). According to column 10, lines 43 to 59 the textile materials to which the treatment described in D2 is applicable include fibres, yarns and fabrics comprising either natural or synthetic fibres. Explicitly mentioned are fibres such as nylon based on aliphatic polyamide.

Thus, in view of D2 the method claimed in claim 6 of the current application seems not fulfil the requirements of Articles 33(2) and 33(3) PCT.

Dependent claims 7, 8 and 10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.

The combination of the features of dependent claim 9 is neither known from, nor rendered obvious by, the available prior art.

3. It is clear from the whole description that the use of the esterase cutinase is an essential feature of the claimed invention:

Since independent claims 1 and 6 do not contain this feature they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.